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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Performing Programmed Horizontal Impacts Using an Inclined Impact Tester¹

This standard is issued under the fixed designation D 5277; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the procedures for reproducing and comparing shock damage, such as that which may result from rail switching or pallet marshalling impacts, using an incline impact tester. It is suitable for simulating the types of shock pulses experienced by lading in rail switching of rail cars with standard draft gear, but not for those with long travel draft gear or cushioned underframes. The test method can also be used for pallet marshalling tests.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazards statements, see Section 6.

2. Referenced Documents

2.1 ASTM Standards:

- D 644 Test Method for Moisture Content of Paper and Paperboard by Oven Drying²
- D 880 Test Method for Impact Testing for Shipping Containers and Systems²
- D 996 Terminology Relating to Packaging and Distribution Environments²
- D 4003 Test Methods for Programmable Horizontal Impact Test for Shipping Containers and Systems²
- D 4169 Practice for Performance Testing of Shipping Containers and Systems²
- D 4332 Practice for Conditioning Containers, Packages, or Packaging Components for Testing²
- E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process³

3. Terminology

3.1 *Definitions*—General terms and definitions used in this

test method may be found in Terminology D 996.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *programming material*—a resilient elastomer with characteristics suitable to control the shock pulse generated, or any other suitable means of control.

3.2.2 *velocity change*—the sum of the velocity at impact and the rebound velocity.

4. Significance and Use

4.1 This test method is for use in evaluating the capability of a container or shipping system to withstand sudden shocks and crushing forces, such as those generated from rail switching impacts or pallet marshalling, or to evaluate the capability of a container and its inner packing, or shipping system, to protect its contents during the sudden shocks and crushing forces resulting from rail switching or pallet marshalling impacts. This test method may also be used to compare the performance of different container designs or shipping systems. The test may also permit observation of the progressive failure of a container or shipping system and damage to the contents. See Practice D 4169 for additional guidance.

4.2 This test method is not suitable for reproducing impact resulting from the switching of rail cars using long-travel draft gear or cushioned underframes. Refer to Method D 4003 (revised) as a more suitable method for testing under these circumstances, or when more precise control of shock inputs is required.

5. Apparatus

5.1 *Inclined Impact Test Equipment*, conforming to the following requirements:

5.1.1 The incline track, backstop, and carriage shall conform to the requirements of Method D 880, except that the backstop need not have a solid steel plate surface or a solid integral mass at least 50 times the mass of the test specimen.

5.1.1.1 No removable hazard shall be fitted.

5.1.1.2 In lieu of steel wheels, wheels of polyoxymethylene (Delrin) plastic may be used in order to reduce noise and improve shock pulse recording.

5.1.2 A programming material or device is required to shape and control the shock pulse seen by the test specimen(s). This material or device may be fastened to either the backstop or the impacting face of the bulkhead. Any material or device may be used, provided that it yields a repeatable, controllable test.

¹ This test method is under the jurisdiction of ASTM Committee D-10 on Packaging and is the direct responsibility of Subcommittee D10.22 on Handling and Transportation.

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² Annual Book of ASTM Standards, Vol 15.09.

³ Annual Book of ASTM Standards, Vol 14.02.